Quadratics Review

1) Factor each quadratic by hand

a) $y = 3x^2 + 31x + 36$ b) $y = 2x^2 - 19x + 24$

2) Expand each quadratic

a) $y = (x - 4)(x + 3)$ b) $y = (5x + 2)(2x - 3)$

3) Find the vertex and roots algebraically and then check graphically.

a) $y = (x + 2)^2 - 9$ b) $y = -2(x - 4)^2 + 8$

c) $y = 3(x - 1)^2 + 9$ d) $y = (x + 3)(x + 5)$

e) $y = x^2 + 8x + 12$ f) $y = x^2 + 4x - 7$

g) $y = -3x^2 + 2x + 1$ h) $y = 4x^2 + 3x + 5$

4) Convert to polynomial form algebraically and then check graphically.

a) $y = (x + 3)^2 - 2$ b) $y = -3(x + 4)^2 + 2$

5) Convert to vertex form algebraically and then check graphically.

a) $y = (x - 2)(x + 6)$ b) $y = x^2 + 7x + 12$

c) $y = 3x^2 + 4x - 3$

6) Convert to factored form algebraically and then check graphically.

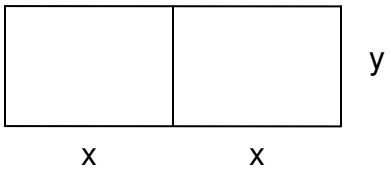
a) $y = x^2 - 2x - 10$ b) $y = -3(x - 2)^2 + 5$

Quadratic Applications

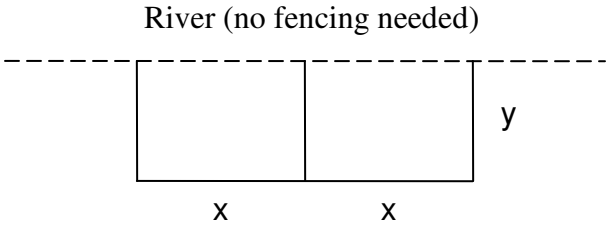
For each problem below find:

a) An equation for area/volume as a function of x
b) The length of x to maximize the enclosed area/volume and the area/volume enclosed
c) The values of x that give an enclosed area/volume of zero
d) The domain of the function

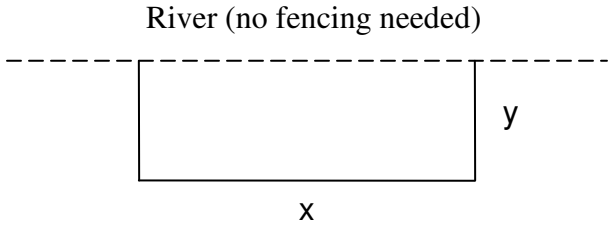
7) A rancher has 200 feet of fencing to enclose two adjacent rectangular corrals (see figure). Find the length of *x* to maximize the enclosed area and the area enclosed.



8) The rancher from problem #1 decides to build his corrals against a river to save fencing. He still has 200 feet of fencing. Find the length of *x* to maximize the enclosed area and the area enclosed.



9) The same rancher from problem #2 decides that he only wants one pen against the river. He still has 200 feet of fencing. Find the length of *x* to maximize the enclosed area and the area enclosed.



Answers:

1a) $y = (3x + 4)(x + 9)$
1b) $y = (x – 8)(2x – 3)$

2a) $y = x^2 – x – 12$
2b) $y = 10x^2 – 11x – 6$

3a) The vertex is (-2, -9); The roots are 1 and -5
3b) The vertex is (4, 8); The roots are 2 and 6
3c) The vertex is (1, 9); The roots are non-real
3d) The vertex is (-4, -1); The roots are -3 and -5
3e) The vertex is (-4, -4); The roots are -2 and -6
3f) The vertex is (-2, 11); The roots are 1.32 and -5.32
3g) The vertex is (1/3, 4/3); The roots are -1/3 and 1
3h) The vertex is (-0.375, 4.4375); The roots are non-real

4a) $y = x^2 + 6x + 7$
4b) $y = -3x^2 – 24x – 46$

5a) $y = (x + 2)^2 – 16$
5b) $y = (x + 3.5)^2 – 0.25$
5c) $y = 3(x + 0.67)^2 – 4.33$

6a) $y = (x – 4.32)(x + 2.32)$
6b) $y = -3(x – 3.29)(x – 0.71)$

7a) $y = -8/3(x – 25)^2 + 1666.67$
7b) $x = 25$ft, $y = 33.33$ft, Area = $1{,}666.67$ft^2
7c) $x = 0$ and 50
7d) Domain (0, 50)

8a) $y = -1.33(x – 50)^2 + 3333.33$
8b) $x = 50$ft, $y = 33.33$ft, Area = $3{,}333.33$ft^2
8c) $x = 0$ and 100
8d) Domain (0, 100)

9a) $y = -0.5(x – 100)^2 + 5000$
9b) $x = 100$ft, $y = 50$, Area = $5{,}000$ft^2
9c) $x = 0$ and 200
9d) Domain (0, 200)